CLAIMS

What is claimed is:

1.   A method of mapping a color specification to colorant amounts when a projected region of color space is to be produced by a selection of colorants from a set of including a first colorant, a second colorant and a
5   third colorant, the second colorant being of similar hue with respect to the first colorant, the method comprising the steps of:

designating a first portion of the region to be produced by a first subset of colorants consisting of two
10 of the first, second and third colorants;

designating a second portion of the region to be produced by a second subset of colorants; and

mapping the color specification into colorant amounts based on the designated portions.

2.   The method of mapping a color specification of claim 1 wherein the steps of designating a first portion and a second portion further comprise:

designating the first portion of the region to
5   be produced by the first colorant and a neutral colorant; and

designating the second portion of the region to be produced by the first colorant and the second colorant.

3.   The method of mapping a color specification of claim 1 wherein the steps of designating a first portion and a second portion further comprise:

designating the first portion of the region to
5   be produced by the second colorant and a neutral
colorant; and

designating the second portion of the region to
be produced by the first colorant, second colorant and
neutral colorant.

4.   The method of mapping a color specification of
claim 1 wherein a projected region of color specification
space for the similar hue is plot-able in relation to a
neutral colorant axis indicative of a gamut of neutral
5   colorant and a non-neutral axis, the non-neutral axis
being indicative of a gamut of the similar hue, the
region being plotted as a continuous finite area and the
steps of designating comprising:

dividing the continuous finite area into a
10   first sub-area and a second sub-area with a border, the
border oriented so neutral axis values change in
proportion to non-neutral axis values as one moves along
the border.

5.   The method of mapping a color specification of
claim 1 wherein a projected region of color specification
space for the similar hue is plot-able in relation to a
neutral colorant axis indicative of a gamut of neutral
5   colorant and a non-neutral axis, the non-neutral axis
being indicative of a gamut of the similar hue, the
region being plotted as a continuous finite area and the
steps of designating comprising:

dividing the continuous finite area into a
10   first sub-area bounded by points that specify black,
white and a maximum of a darker of the first and second
colorants and a second sub-area bounded by points that

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specify white and each of the first and second colorant.

6.   The method of mapping a color specification of claim 1 wherein a projected region of color specification space for the similar hue is plot-able in relation to a neutral colorant axis indicative of a gamut of neutral colorant and a non-neutral axis, the non-neutral axis being indicative of a gamut of the similar hue, the region being plot-able as a region triangle and the steps of designating comprising:

dividing the region triangle into a first sub-triangle and a second sub-triangle with a dividing line extending from a white point in the color specification space to a point on a hypotenuse of the region triangle.

7.   The method of mapping a color specification of claim 1 wherein the projected region of color specification space for the similar hue is plot-able in relation to a neutral colorant axis indicative of a gamut of neutral colorant and a non-neutral axis, the non-neutral axis being indicative of a gamut of the similar hue, therefore, the region being plotted as a region triangle and the steps of designating comprise:

dividing the region triangle into a first sub-triangle and a second sub-triangle with a dividing line extending from a black point in the color specification space to an intermediate point on the non-neutral axis.

8.   The method of mapping a color specification of claim 1 wherein a projected region of color specification space is plot-able in relation to a neutral colorant axis indicative of a gamut of neutral colorant and a non-neutral axis, the non-neutral axis being indicative of a

gamut of the similar hue, therefore, the region being plotted as a region triangle and the steps of designating comprise:

dividing the region triangle into a first sub-triangle and a second sub-triangle with a border, the border oriented so neutral axis values change in inverse proportion to non-neutral axis values as one moves along the border.

9. The method of mapping a color specification of claim 1 wherein a projected region of color specification space for the similar hue is plot-able in relation to a neutral colorant axis indicative of a gamut of neutral colorant and a non-neutral axis, the non-neutral axis being indicative of a gamut of the similar hue, therefore, the region being plotted as a region triangle and the steps of designating comprise:

dividing the region triangle into a first sub-triangle and a second sub-triangle with a dividing line extending from a black point in the color specification space to an intermediate point on the non-neutral axis.

10. The method of mapping a color specification of claim 1 wherein the region is degenerate and therefore, before the step of designating a first portion the method further comprises:

transforming the region so that the transformed region is non-degenerate and wherein the remaining steps are performed on the transformed region.

11. The method of mapping a color specification of claim 1 wherein points in color specification space corresponding to extreme amounts of the first, second and

third colorants are collinear, the method further comprising:

transforming the region so that the three transformed points are no longer collinear and define a region having a nonzero area.

12. The method of claim 1 further comprising:

placing maximal colorant points in the specification region at locations based on saturation and lightness characteristics of the colorants.

13. The method of claim 12 wherein the step of placing maximal colorant points further comprises:

placing a darker and most saturated of the first and second colorants at a most saturated point in the color specification region; and

placing a lighter and less saturated of the first and second colorants at a point between the most saturated point and a white point.

14. The method of claim 10 wherein the step of transforming the region comprises:

segmenting the region into a first segment, a second segment and a third segment, wherein the first segment is bounded by points that specify white, a relatively light intermediate neutral color and a maximum of a lighter of the first and second colorants, the second segment is bounded by points that specify the maximum of the lighter of the first and second colorants, the relatively light intermediate neutral color, a relatively dark intermediate neutral color and a maximum of the darker of the first and second colorant, and the third segment is bounded by points that specify the

maximum of the darker colorant, the darker intermediate
15   neutral color, and black;

warping the region so that the point that
specifies the maximum of the lighter of the first and
second colorants is positioned within the warped region
to be a mapping for a color specification calling for a
20   maximum of the similar hue, and the point that specifies
a maximum of the darker of the first and second colorants
is positioned within the warped region to be a mapping
for a color specification calling for a point positioned
between the black specification point and the point for
25   the maximum of the similar hue.

15.   A   method   of   transforming   a   classic   color
description into a redundant colorant color description
comprising the steps of:

obtaining an input color specification defined
5   in a classic color coordinate system;
for each non-neutral colorant value in the classic color
description:

determining   an   first   amount   of   a   primary
colorant;
10   determining   an   first   amount   of   a   secondary
colorant, said secondary colorant having substantially
the same hue as the primary colorant; then,
arranging   the   first   primary   and   secondary   colorant
amounts determined for each colorant value in the classic
15   color   description   as   a   first   redundant   colorant   color
description containing non-neutral colorant values.

16.   The   method   of   transforming   a   standard   color
description into a redundant color description of claim
15 further comprising:

applying a redundant colorant under color
5 removal process to the first redundant colorant color
description containing non-neutral colorant values to
generate a redundant color description including a
neutral colorant value.

17. The method of color image processing according
to claim 15, wherein the steps of determining are carried
out such that one of the first and second colorants is
favored thereby conserving the other.

18. The method of color image processing according
to claim 15, further comprising:
dividing into first and second regions an
output color gamut achievable by employing the first and
5 second colorants.

19. The method of color image processing according
to claim 18, wherein the amounts in the determining steps
are determined such that renderings corresponding to the
first region are achieved employing substantially none of
5 the second colorant and renderings corresponding to the
second region are achieved employing a blend of the first
and second colorant.

20. The method of transforming a classic color
description into a redundant colorant color description
of claim 15 further comprising:
for each non-neutral colorant value in the classic
5 color description:
determining an second amount of a primary
colorant;
determining an second amount of a secondary
colorant, the secondary colorant having substantially the

10　same hue as the primary colorant, the first and second amounts being determined in a manner different that the first amounts; then,

　　arranging the second primary and secondary colorant amounts determined for each colorant value in the classic

15　color description, as a second redundant colorant color description containing non-neutral colorant values; and blending the first redundant colorant color description and the second redundant color description to generate a blended redundant colorant color descriptions.

　　21.　The method of transforming a standard color description into a redundant color description of claim 20 further comprising:

　　applying a redundant colorant under color

5　removal process to the blended redundant colorant color description　to generate a redundant color description including a neutral colorant value.

　　22.　An image processing system operative to map a color specification to output colorant amounts where the output colorants include two colorants of similar hue, the image processing system comprising:

5　　a first colorant splitter operative to receive the color specification and map the color specification to similar hue output colorant values.

　　23.　The image processing system of claim 22 wherein the first colorant splitter is included in a first non-neutral colorant determiner, the first non neutral colorant determiner comprising:

5　　a first plurality of colorant splitters, each colorant splitter operative to receive a subset of values

from an input pixel and generate a subset of output pixel
values, the subset of output pixel values including two
colorant values for two colorants of similar hue, the
10   output of each of the plurality of colorant splitters
being combined to form a first intermediate pixel.

24.   The image processing system of claim 23 further
comprising:

an undercolor remover operative to perform
undercolor removal on the intermediate pixel to generate
5   an output pixel that includes a neutral colorant value.

25.   The image processor of claim 23 further
comprising:

a second non-neutral colorant determiner
operative to map the input pixel to an output pixel in a
5   manner different than the first non-neutral colorant
determiner, the second non-neutral colorant determiner
comprising a second plurality of colorant splitters, each
colorant splitter operative to receive a subset of values
from an input pixel and generate a subset of output pixel
10   values, the subset of output pixel values including two
colorant values for two colorants of similar hue, the
output of each of the plurality of colorant splitters
being combined to form a second intermediate pixel;

a blender operative to receive the input pixel
15   and first and second intermediate pixels, and to perform
a weighted blend of the first and second intermediate
pixels based on colorant values of the input pixel to
generate a blended output pixel; and

an undercolor remover operative to receive the
20   blended output pixel and perform undercolor removal on
the blended output pixel to generate an output pixel that
includes a neutral colorant value.

26.   The image processing system of claim 22 further comprising:

        a buffer operative to accumulate output pixels to generate an output image; and

        an output device operative to receive the image.

27.   The image processing system of claim 22 wherein the output device comprises:

        a xerographic printer.

28.   The image processing system of claim 22 wherein the output device comprises:

        an inkjet printer.